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POLYTECHNIC INSTITUTE OF BROOKLYN

An account of the Educational Purposes and Development of the Institute during its first Century

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William H. Harrison, 1938-
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J. Monroe Hewlett, 1908-1927
Edward E. Hill, 1949-1951
James How, 1853-1888
George S. Howland, 1853-1855

George A. Jarvis, 1856-1893

Frederick R. Kellogg, 1899-1910
Henry R. Kinsey, 1933-1942

Dillon S. Landon, 1853-1872
Nelson P. Lewis, 1899-1912; 1923-1924
Alfred F. Lichtenstein, 1938-1947
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Josiah O. Low, 1853-1895
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C. Walter Nichols, 1930-1932
Othniel F. Nichols, 1903-1908
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Lowell M. Palmer, 1894-1902
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George Foster Peabody, 1899-1910
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Joshua L. Pope, 1862-1883
Charles E. Potts, 1907-
William A. Prendergast, 1918-1937
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Joseph H. Raymond, 1884-1915
Rossiter W. Raymond, 1900-1918
William A. Read, 1895-1897
Robert I. Rees, 1928-1936
John Reynolds, 1885-1889
Herbert J. Robinson, 1933-1936
Harry S. Rogers, 1938-
Richard Lord Russell, 1907-1920

Frederick H. Sanborn, 1916-1922
Rollin Sanford, 1855
Robert A. Shaw, 1914-1948
Matthew S. Sloan, 1921-1932
Henry S. Snow, 1887-1908
Michael Snow, 1889-1890
James E. Southworth, 1853-1862
Elmer A. Sperry, 1922-1930
Elihu Spicer, 1890-1893
Sanford H. Steele, 1908-1916
James S. T. Stranahan, 1853-1898
Robert E. Swezey, 1912-1915

David L. Tilly, 1936-1949
Allan T. Towl, 1930-1933
Thomas H. Troy, 1902-1904
R. Sands Tucker, 1853-1858

Ernest M. Van Norden, 1920-

Luther F. Warren, 1924-1936
Alexander M. White, 1858-1906; 1907-1908
Alfred T. White, 1889-1890
Stephen V. White, 1889-1909
William Augustus White, 1879-1927
Carl Whitmore, 1949-
Victor Wichum, 1936-1939
Harry G. Willnus, 1949-
Henry R. Worthington, 1853-1859
Luther B. Wyman, 1853-1879

William F. Zimmerli, 1943-

To understand any institution which has one hundred years of life behind it, it is helpful to know the climate in which it grew and to sift the soil from which it drew its strength. This is no less true of the Polytechnic Institute of Brooklyn, which during the 1954-55 academic year celebrated its centennial anniversary.

Polytechnic was the product of an era, the creation of the sentiments and ideals which motivated men in the City of Brooklyn a century ago. Because its conception and birth, its growth and development, were influenced so strongly by these considerations of time and location, it becomes important for us to consider briefly the spirit of the Brooklyn of the early and middle nineteenth century. Later, because Brooklyn, like the rest of America, was caught up in the complex of rapid scientific and technological change which was creating a new way of life, we must have an insight into these forces in order to see how and why Polytechnic has become what it is today.

THE YOUNG CITY OF BROOKLYN

When the Brooklyn Collegiate and Polytechnic Institute, as the school was first named, was chartered in 1854, a period of intensive commercial, civic, and cultural activity had already begun in the young City of Brooklyn, which had been incorporated only twenty years before. The population had leaped from 24,000 in 1834 to 130,000 in 1853. Several Brooklyn industries, white lead manufacturing and shipping, for example, were among the leaders in the whole country.

The village had given way to the city, with horse cars beginning to replace stage coaches on the streets of Brooklyn, railway lines bisecting the pleasant fields and woods, block-paved streets and gas lights invading more and more of the rural scene. Fifteen public schools educated 18,000 young scholars daily, while another 800 students attended evening sessions. Rope, chalk, and leather manufacturing were important industries, while the building trades prospered greatly, as evidenced by the 2,500 new structures raised in 1852 alone. Businesses concerned with consumer goods and services flourished as the population expanded; here, in truth, a great community had been born.

Across the river, New York City was bursting with activity as the thriving trade on the seas, the vast areas being opened by the railroads, and the swelling flood of immigration created an amalgam in which the need to expand could not be denied. All of America was feeling the pangs of growth and Brooklyn, at the gateway to America, was in the vanguard.

A substantial class of people, some of whose business interests were in the neighboring New York, and others whose economic fortunes were centered in Brooklyn, but all of whom lived in the budding island metropolis, provided the leadership to the com-

munity during these years of political, cultural and economic formation. These were critical years for Brooklyn, as for all communities, because "just as the twig is bent the tree's inclined."

Fortunately for Brooklyn and its people, a remarkably strong set of altruistic values and attitudes characterized its leadership from the beginning, and are reflected in the history of the community's institutions. Brooklyn is able, for example, with considerable historical support, to vie with New York in claiming the first free public schools in America, and as early as 1825 the Apprentices Library, its cornerstone laid by the Marquis de Lafayette, opened its reading rooms for the youth of the community. The Athenaeum, the Brooklyn Mercantile Library Association, later to become the Brooklyn Public Library, clubs devoted to cultivation of the arts, were founded to enrich the cultural life of the city. The world-famous Brooklyn Institute of Arts and Sciences, later to sponsor the Museum, the Opera and the Botanic Garden, had its origin and growth in the Brooklyn of the early and middle nineteenth century.

The Churches of the city were very well attended, and the annual parade of the Sunday School children, still held today, was a civic as well as religious event of leading importance. Charitable organizations and shelters for the orphaned, the aged, the poor and the ill had already been organized and were contributing vital and necessary services to the people who needed them. In addition to the public schools, several private schools which, unlike their publicly supported counterparts, offered curricula through what is called the secondary level today, had been founded. Unquestionably the best known and received of these schools at mid-century, was the Brooklyn Female Academy where several hundred young ladies, daughters of the elite, received educations calculated to prepare them for their eventual positions as partners of the community's leaders.

Apprentice's Library

As the second half of the nineteenth century commenced, we find Brooklyn a city of which two historians have left distinct but equally true estimates. One has said: "Brooklyn then had all the elements of trade to insure its prosperity, its docks were the wonder of America, and some of its industries far exceeded in value of their annual output that of any place in the world." Another biographer of the City wrote that it was "the cultural Acropolis" of America. This was the background against which plans were formulated by a group of the City's business, industrial and professional leaders to found a school for boys and young men.

Brooklyn Female Academy

They foresaw the need for educated and well-trained leaders for the increasingly complex operations of the businesses and industries which Brooklyn was developing, and for the cultural and social services without which the City could not flourish. Brooklyn and its institutions, business, cultural and social, demanded that a young men's school, designed to prepare youths for active leadership in all phases of the City's life, be established.

Encouraged by the success of the Female Academy and impressed with its intellectual attainments and contributions, various conversations were held between Messrs. James How, Edward Anthony, Cyrus P. Smith, John H. Prentice, Dr. J. S. Thorne and other prominent citizens deploring the lack of a similar institution for boys. Definite plans had not taken shape to remedy the situation when disaster struck on Brooklyn Heights on New Year's morning of 1853 and the Female Academy burned to the ground.

Unlike most tragedies, this one proved beneficent in several ways. First, Mrs. William S. Packer came forward and endowed the stricken school with $65,000, more

than enough to re-establish it; further, as one condition of her generosity, she stipulated that the stockholders of the Female Academy transfer their ownership to support the foundation of a similar school for the education of young men. This good fortune spurred the interest and activity of those who had been discussing such a plan so that by May 17, 1853 Articles of Association for the establishment of the boys' school could be presented and adopted by the founding group as then constituted.

THE BROOKLYN COLLEGIATE AND POLYTECHNIC INSTITUTE

Moving swiftly now, a permanent Board of Trustees representing some of the most distinguished names in Brooklyn was formed on January 20, 1854 and eleven days later the present site of the Institute at 99 Livingston Street was purchased at a cost of $16,000. This first permanent board included: Hon. J. S. T. Stranahan, R. Sands Tucker, L. B. Wyman, S. B. Chittenden, Josiah O. Low (secretary), John T. Martin (treasurer), Horace B. Claflin, Charles S. Baylis, James How, D. S. Landon, M. D., M. G. Harrington, I. H. Frothingham (president), H. R. Worthington, J. E. Southworth, Chas. R. Marvin, Abraham B. Baylis, A. S. Barnes.

The Board published an interesting, and in many ways remarkable, document in October 1854, a "First Annual Report" of the Board of Trustees of the Brooklyn Collegiate and Polytechnic Institute, as the new school had been named in its charter received from the Board of Regents in April of that year. This report is remarkable because it mapped with such great accuracy the course that the school was to take for the next century, a process that was to be evolutionary and gradual, but always consistent with the stated objectives of the founders.

Several passages from this report are worthy of noting here so that the ultimate development of the school can be seen as something conceived at the outset, and that many of its most distinguishing characteristics today can be traced to its earliest beginnings. First, it was the stated purpose of the board to establish

> "an educational institution in our midst, which, while it should not only meet the present and pressing wants of the members, would at the same time enable us to give our sons, under our own inspection, and surrounded by all the saving influences of home and the family circle, such an education as would qualify them in a far higher degree, through an enlarged, liberal and thorough training in a course of practical, scientific and classical studies to enter successfully upon the active pursuits and duties of life . . ."

The Athenaeum

Further,

"that its location should be as central, and as easily accessible as possible by public conveyance, from all parts of the city . . ."

Nor,

"would they by any means lose sight of that practical feature in education which the activities of the age, and our peculiar local position require . . . but giving at all times, especial prominence to those departments of general knowledge so eminently essential in qualifying the young for industrial pursuits and commercial operations of metropolitan life, but they would yet look forward to an early establishment upon a liberal foundation, of a strictly Polytechnic Department inferior to no existing institution of the kind which our country can now boast."

"They would entertain this hope from a growing conviction that . . . no location could be selected the country over, embracing so many advantages for the successful establishment of such a department as our own city, in the opportunities here afforded in the mechanical, manufacturing and scientific operations by which we are surrounded, for the practical illustration and application of science in its relations to the arts of civilized life."

It is not difficult to see clearly traced in these passages outlines of the great twentieth century school of science and engineering known far and wide as "Brooklyn Poly," a commuter college to which its thousands of students come from home each day, an urban institution whose affairs and interests are inextricably interwoven with the needs of the community and its industries, a school whose future, as well as past, is cast in the Borough Hall area of Brooklyn "at the convergence of all New York subways," a technical school where the employees of over one thousand engineering and industrial firms gain the theoretical knowledge that gives meaning and scope to their practical experience, and where the faculty, regular and adjunct, works hand in glove with the many varied industries and research enterprises of the metropolitan area. It is with the educational development of this collegiate part of the original institution that this account will be concerned primarily rather than with the preparatory department.

Left to right: Isaac H. Frothingham, President of the Board of Trustees, 1853-1889; Member, 1853-1890. John H. Raymond, LL.D., President of the Institute, 1855-1864.

While these things were in the making, however, a century was to pass, a new civilization was to rise, man's knowledge about himself and the universe was to expand immensely, and new challenges were to face the religious, educational and cultural institutions of the world. The growth and development of Polytechnic Institute had much in common with this ferment, deriving no small part of its nature from the historical imperatives of its times.

"THE POLY"

On September 10, 1855, 250 young men, aged from about ten years to perhaps sixteen or seventeen years, swarmed through the doors of the Brooklyn Collegiate and Polytechnic Institute at 99 Livingston Street in the City of Brooklyn for the first time. Receiving them as president was Dr. John H. Raymond, one of the founders of the University of Rochester and a distinguished educator of his day. Assisted by a staff of eleven professors, he faced the task of sorting the "horde" of youths, coming from varied educational backgrounds, into a semblance of academic order so that they might be assigned to classes and work begun.

Within a year of its opening "The Polytechnic", as it was quickly known to the students and public alike, and soon shortened even further to "The Poly", was divided into Academic and Collegiate Departments, with a principal and a superintendent for each division. Mr. Edward C. Seymour was principal of the academic department in which the work included roughly the equivalent of today's latter elementary and preparatory school years. The collegiate department, with junior and senior sections, was under the guidance of Mr. Robert Foster as superintendent, and contained the accepted equivalent of freshman or sophomore years in the established universities.

The school was an immediate success, with the enrollment being nearly doubled at the beginning of the second year. A scholarly faculty, strict academic standards, an "advanced" philosophy of discipline for the times in which corporal punishment was strictly outlawed, and a student body drawn from the mansions and substantial homes of the "Heights", the "Hill", the "Eastern District" and other parts of Brooklyn—these were the characteristics of "The Poly" in its earliest years.

The Civil War brought changes, though not essential, to the school. The students naturally were excited by all war news, and each Northern victory was marked by an immediate half-holiday. The Institute took on a semi-military aspect with the formation of the "Polytechnic Cadets," uniformed in blue trousers, frock coat and military cap, which formed a complete battalion and drilled regularly. Only students in good standing were admitted to the corps, upon the vote of the membership and bound strictly to observe the rules and regulations. Probably about 100 Poly men saw actice service during the war. The War came close to home when Mr. Joshua Woodrow Sill, professor of mathematics and civil engineering, left to serve with the Ohio State Volunteers and later, as a Brigadier General, was killed in the battle of Stone River at Murfreesboro, Tennessee.

In 1864 Dr. Raymond who had built Polytechnic into a leading institution in less than a decade departed to become first president of Vassar College. He left a school where people from as far away as Boston sought to send their sons and where graduates, who had completed one or more grades of the Collegiate course, went on to finish their educations at Harvard, Yale, Princeton and other leading universities, often being admitted with advanced standing.

By this time the courses offered at the school included the Classical or Preparatory Collegiate, the Scientific and the Commercial, each designed to meet specific aptitudes and objectives of the pupils. Ten subject areas of study were included in the courses, the content and concentration varying with the different curricula. They were English Language and Literature, Mathematics, History and Geography, Penmanship and Bookkeeping, Ancient Language, Modern Languages, Physical Sciences, Philosophy, Drawing and Vocal Music. For the most part the Commercial and Scientific Courses were considered terminal programs, and the Classical a preparation for advanced work.

"THE REIGN OF DAVID"

To succeed Dr. Raymond, the Trustees of the Polytechnic called Dr. David H. Cochran, then head of the only school in New York State for the training of teachers, the Albany State Normal School. A scholar and task-master, he was destined to guide the school for thirty-five years, steering it through the development of its collegiate program to the point of its recognition by the state and the growth of its curricula in science and engineering, culminating in the changing of the school's name, the erection of a new building to house the technical programs, and the ultimate identification of the Institute with science and engineering.

One of Dr. Cochran's earliest innovations was the division of the course of study, especially in the Collegiate Department, into four areas of specialization: the Classical or Preparatory for those readying for entrance to college; the Scientific, for those bent in the direction of science and engineering, and including over "two hundred laboratory experiments, field trips and exercises" in addition to theory; the Liberal for those who wanted to finish their entire higher education at Polytechnic, without benefit of the classics; the Commercial course, a business program strongly reinforced with cultural subjects, preparing young men for immediate entry into business life.

Bessemer Converter

Polytechnic's service to the community and its youth was increasingly apparent in these years when several hundred boys and young men, destined to become leaders in many different walks of life, followed the curricula designed to meet their varying needs, tastes and abilities. In 1869, The Board of Regents of the University of the State of New York, recognizing the high level of the Polytechnic program in the collegiate department, authorized the conferral of the Bachelor of Science degree to those completing the Scientific Course and the Bachelor of Arts degree to those finishing the Liberal Course. While the non-degree program continued to be the most popular for many years, this recognition of the merit of the scientific program confirmed the course development already in progress for some years, and justified the ambition of the original Trustees to found a "Polytechnic Department second to none" in the country. The first two degrees were conferred in 1871.

The next twenty years were destined to be significant for Polytechnic and for America. What was happening in the United States? What forces were at work which would give direction to the strong young country emerging from the agony of a Civil War, and lend character to its institutions?

THE NEW ERA

The 1876 Centennial Fair, held in Philadelphia, graphically summarized the achievements of the country in the hundred years since its birth, and indicated the

David H. Cochran, Ph.D., LL.D., President of the Institute, 1864-1899.

paths it was to take in the closing years of the 19th century. This was The New Era, in which the discoveries of science and the innovations and applications of engineering, and the great natural resources of the country, coupled with a laissez-faire philosophy of government, were to multiply the wealth and produce of the United States beyond anything experienced in human history. Here in the great exhibition halls were all the marvels of technology, many of the tools and processes which made them possible, the power machinery, the railroad equipment, the steel, the agricultural machines and a host of other marvels destined to form the foundation for a new civilization.

For, in this last quarter of the century, hundreds of thousands of miles of track would be laid, the productivity of farm acreage would be increased many-fold by the use of new sowing and reaping machinery, the manufacturing of capital and consumer goods would be expanded immeasurably, the populations of cities, with all the consequent demands for housing, transportation, foodstuffs, clothing and services would expand dramatically. It almost seemed that under this great continent a vast volcano had been boiling and storing up its energy, awaiting the propitious moment to erupt. The development of the Bessemer process for making steel, the refinement and expansion of the uses of steam power and the opening of undeveloped frontier areas joined forces to create history's most remarkable expansion of production and wealth.

Spinning the cable

Nowhere in America were the effects of these vast industrial and commercial enterprises felt more quickly than in the New York area. Brooklyn shared this sensitivity because of its own industrial and commercial activities and its role as the homesite of thousands of the leaders and workers in New York City's business community. The opening of the Brooklyn Bridge in 1883 drew the two cities even closer together and enabled New York to add its strength to the already sturdy Long Island metropolis. Competitive in many ways, the two cities could not avoid interacting upon each other any more than they could avoid being caught in the mainstream of the industrial current that was rising to flood levels in America.

American education was not unresponsive to these movements. In 1840 there were two schools of engineering, as we recognize them today, in the United States. In 1862 the Morrill Act was passed by Congress authorizing the grant of lands to states

which would maintain colleges offering courses in agriculture and the mechanic arts "to promote the liberal and practical education of the industrial classes." Spurred by this, and by the rapid growth of industrial technology, there were 70 engineering schools by 1872, with the number increasing yearly and the specialization in courses changing apace with industrial needs.

That Polytechnic was strongly moved to the continuing development of its scientific courses and expansion into engineering is most understandable, when we appreciate the spirit of the times and the forces which were at work, particularly when viewed in the light of the original declarations of its trustees, and Poly's own early curriculum in science.

A RECHRISTENING—THE POLYTECHNIC INSTITUTE OF BROOKLYN

In 1885, the Scientific course was divided, after the second college year, into engineering and applied chemistry; two years later, a further refinement resulted in one course being designated civil engineering and the other applied chemistry and electrical engineering. The realities of the day would not be denied. The Board of Trustees, seeing that the continued development of the institution under the charter originally granted to the "Brooklyn Collegiate and Polytechnic Institute" would be most difficult, obtained a new provisional charter from the Board of Regents of the University of the State of New York in 1889. This established the "Polytechnic Institute of Brooklyn", which, upon acquiring the legally required endowments, was permanently chartered in January 1890, with the governing body known as "The Corporation" henceforth. As a specific provision, Polytechnic Institute was authorized to "conduct an academic or preparatory department in connection with the Institute", which it continued to do until 1917.

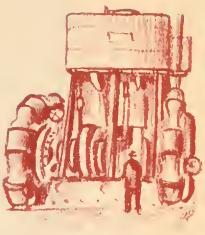
It was also in 1889 that the thirty-six year term of Mr. Isaac H. Frothingham as president of the Board of Trustees came to an end. His inspiring and unselfish service to the school certainly contributed to Polytechnic's success in the critical beginning years of its life. He started the tradition of great voluntary service which has marked the Polytechnic board throughout its history.

The closing years of the "Reign of David," which some historians have called the thirty-five year presidency of Dr. Cochran, included many important steps in Polytechnic's evolution. In 1890, a large new building at 85 Livingston Street was built and occupied, enabling the complete physical separation of the preparatory and collegiate activities of the Institute. In the vigor of its new life, the college then offered a one year commercial course, a two year classical course, and the four year degree-granting Scientific and Liberal courses. The Scientific course by now was divided into three areas of specialization, the Engineering (Civil and Mechanical), the Electrical Engineering, and the Chemistry, for which the bachelor of science degree was offered. In 1892, the Regents authorized conferral of the degrees of Civil Engineer and Electrical Engineer after one year of post-graduate study, in effect creating five year programs in those fields. In 1899, a separate course in Mechanical Engineering was established.

Polytechnic closed the nineteenth century a full fledged school of engineering, and offered as well strong programs in the liberal arts, chemistry and in its preparatory department. It is interesting to note that the first annual meeting of the Society for The Promotion of Engineering Education, after its founding meeting, was held at Polytechnic Institute in 1894, presaging the close relationship of Polytechnic and its staff

throughout the years with the growth and activities of nearly all societies devoted to the advancement of engineering, educationally and professionally as well.

In 1898, Brooklyn became a part of New York City—always to be the largest single part, the most distinctive in its spirit and pride, often more "partner" than "part", and its interests for better or worse merged with those of the City which forever would be "across the River". Like Brooklyn itself, Polytechnic Institute has maintained its individuality in the years since, and has been closely identified with the affairs, interests, achievements and difficulties which have marked the marriage of the two great communities. But, again like Brooklyn, Polytechnic's services and influence have gone far beyond the borders of the Borough. Its name has become known throughout the world through its contributions to science, engineering and education.



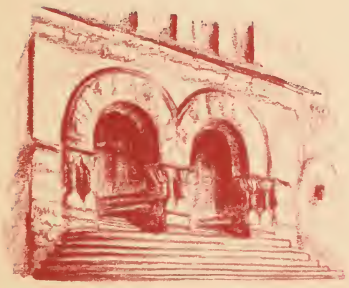
Edison's Multipolar Dynamo

THE TWENTIETH CENTURY

Entering the Twentieth Century, both Brooklyn and Polytechnic were beginning new chapters in their lives, having passed through the years of formation, and moving into a decade in which they would witness events which one day would bring new meaning and richness to the histories of both.

To the magic combination of steel and power, in their various uses and adaptations, a third application of the fruits of scientific discovery was adding a momentum to industry and the national economy which they have not lost to this day. This was the production of electrical power for the machines of industry. The simplification and the greater flaxibility given to industrial processes which received their motivating power from a panel box on the wall, instead of from a steam engine and a complicated system of belts and shafts, spurred production of old items and stimulated the invention of new, almost beyond belief. Transportation, communications, production—all were to experience new growth, broadened uses, greater service.

Polytechnic started the Twentieth Century with Mr. Henry S. Snow as Chairman of the Corporation and acting as President of the Institute while a successor to Dr. Cochran was being sought. Mr. Snow had succeeded Mr. William Augustus White, long-term board member who had served in the chairmanship for ten years (1889-1899) with distinction. During Snow's tenure in the presidency, the actual administrative details



New quarters for the College, opened in 1890 at 85 Livingston Street

The Chemical Engineering laboratory, about 1919.

of operation were left in the hands of the educators who headed the College and the Preparatory school. A notable event which occurred during this period was the beginning of a graduate program leading to the degrees of master of science and master of arts, approved by the Board of Regents in 1901.

A new president assumed office in 1904, Fred W. Atkinson, PH.D., LL.D., who was destined to occupy the office for twenty-one years, and to make some important innovations. At the same time Dr. William Henry Nichols became Chairman of the Corporation. By the time of President Atkinson's inaugural, the Twentieth Century, caught up in the headlong rush of technological change had already witnessed dramatic events which, in their own time, would spur further exciting developments. For example, these occurrences had already taken place in the four brief years of the new century—Marconi had signalled the famous "S" across the Atlantic, two automobile pioneers had made the first transcontinental trip by car, the first Model T Ford had been built, Orville Wright had made man's first successful flight in a mechanically powered, heavier-than-air craft.

In the ports of America the annual tide of immigration was swelling to the million mark, bringing the willing, anxious manpower to give the sinew and muscle to the industrial empire being forged from the coal mines and steel mills of Pennsylvania to the factories of New England, from the burgeoning cities of the West and Far West to New York City where the rapidly multiplying population pushed northward to the Bronx, and eastwards to the ocean shores of Brooklyn and Queens.

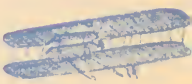
New York was then filled, as it is today, with ambitious, capable men and women strongly desirous of pursuing a higher education, but who were thwarted from doing so because of unfortunate financial circumstances. Business and industry as never before had a great need for informed, well-trained personnel. To meet the needs of these people and the community businesses and professions, Polytechnic Institute became one of the very first colleges in the United States to inaugurate an evening program paralleling its daytime offerings. Evening classes were commenced in 1904 in science and the various fields of engineering, and also in liberal arts with special emphasis being placed upon pedagogy. The regular Polytechnic faculty was augmented for this program by

leading practicing engineers and scientists from New York industry. This intimate personal relationship between the school and the local industries, in which the employees of the latter, either as students or teachers, became members of the Polytechnic family was to persist for the next half century and more, and to grow far beyond the original relationship. The year 1905 also saw the beginning of the chemical engineering course as a separate program. During the following year, the initial list of the Carnegie Foundation for the Advancement of Teaching included Polytechnic as a beneficiary.

The perennial concern of the engineering educator, and it seems, of his liberal arts colleagues, has been the development of an educational program for the technical student in which he would be able to benefit from the wisdom of the ages through the study of as much of the humanities and social sciences as the curriculum would allow. Astute engineering educators, while holding that the techniques of rationalization involved in the essentially problem-solving content of most subjects in science and engineering were as satisfactory for developing the reasoning powers of the technical students as the usual non-technical curricula, nevertheless would be pleased to give their students as many of the "cultural" courses as they could. The problem today is still far from solution, with some engineering programs extended to five years to make room for more non-technical material, and an occasional dim voice is heard in the distance saying that a "six-year engineering program" is the only solution if a truly "rounded" technical man is to be produced with no sacrifice of needed technical subjects.

Polytechnic thought of this problem in 1905 and offered as its solution that which is considered "pioneering" fifty years later—the six year combined arts and engineering program. The catalog of that year states, "For the benefit of those who desire a broader culture than a specialized engineering course of four years can afford, the College offers four combination courses, each of six years duration, leading to the degree of Bachelor of Arts as well as the several engineering degrees."

This program was not to last very long, for the time was coming when Polytechnic would devote all of its energies to the scientific and engineering curricula, which were in constant need of development and enrichment to keep in step with technological improvements in practice as well as the applications of new scientific discovery. These were dynamic times for the technical schools. For these reasons Polytechnic dropped the liberal arts program in 1908, making the final and irrevocable commitment to science and engineering as its prime, eventually sole areas of specialization. The pressures of the industrial ferment could not be denied. Trained manpower and leadership were needed as never before.



The next quarter century was one of strengthening for Polytechnic. Its objectives had been clarified and the school settled down to the task of producing the engineers needed by all segments of industry in the metropolitan area. Throughout the country this was a period during which engineering curricula, although reasonably well established and defined, were undergoing changes and modifications, additions and deletions. The energies of the engineering faculties were directed to the organization of courses and methods of instruction, and upon the acquisition and development of facilities and equipment. Course content, admission requirements and professional standards were brought into reasonable harmony throughout the country, now that the relatively new engineering colleges had the opportunity for serious self-examination. Engineering education was coming of age, no longer a fragment of the scientific curricula, but a mature,

well-defined, purposeful educational process, equal in all respects to the older disciplines in medicine, law, and the liberal arts.

Poly Prep at Dyker Heights

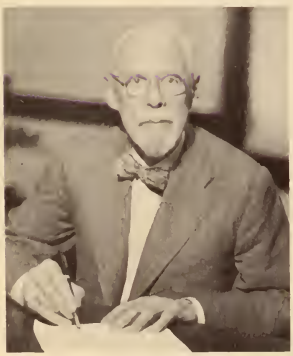
During all of this, Polytechnic's preparatory department had continued to offer excellent secondary education for boys and young men preparing to enter college, and mostly for those going on to liberal arts programs. This dichotomy of interest and function did not serve well either the college or the preparatory department, and it became increasingly apparent that it would be best for both if an administrative and physical separation were made. Finally, in 1917 the Polytechnic Preparatory Day School was chartered as a separate institution, obtained its own campus and buildings in Dyker Heights, and continued there the distinguished history which had made it one of America's fine preparatory schools.

In 1922, the leadership given the Polytechnic Corporation for 18 years by Mr. William H. Nichols came to an end. He was succeeded by Mr. Charles E. Potts, a distinguished graduate of Polytechnic who was to be Chairman for thirty years, a wise counsellor and staunch supporter through a period when vision and sympathetic counsel were essential.

The fourth president of Polytechnic Institute was Parke Rexford Kolbe, PH.D., formerly president of the Municipal University of Akron, who assumed office in 1925. During his seven year presidency, the graduate program was extended to the evening session so that by 1928 Master's degrees were offered in chemistry and in chemical, civil, electrical, and mechanical engineering. The South Building was acquired, added to the several already occupied by the Institute; a summer session was instituted. Historically, Polytechnic was readying itself for the greater expansion that was to come during the succeeding presidency, when the school, nurtured for three quarters of a century, bridging two eras in American history, the epitome of institutional growth and development within specific cultural patterns, was to reach the fullness of its maturity.

THE FIFTH PRESIDENT

Dr. Harry Stanley Rogers assumed the presidency of Polytechnic Institute in September 1933. During the previous year, Mr. Potts, Corporation Chairman, had been



Left to right: Charles E. Potts, Chairman of the Corporation, 1922-1952; Member, 1907- . Harry S. Rogers, Sc.D., LL.D., D. Eng., President of the Institute, 1933- . Preston R. Bassett, Chairman of the Corporation, 1952- ; Member, 1948-

acting president of the Institute, after Dr. Kolbe's resignation. Dean of Engineering at Oregon State College, Dr. Rogers had been actively interested in developing the philosophy and methodology of engineering education. With a background that included industrial and educational experience, classroom teaching, school administration and engineering practice, Dr. Rogers came to Polytechnic when the great economic blight of the early Thirties had America in its grip, and its effect was being felt no more keenly anywhere than in the colleges and universities.

At the close of the academic year 1932-33, an enrollment of 2,004 at Polytechnic was reported, a decline of over 500 from two years before, and was to drop off nearly another hundred during the first year of the new regime. As noted previously, several master's programs were being offered in the Graduate School for about 250 registrants annually. Polytechnic had not launched into research on an appreciable scale. The time had come when the institution, of necessity, had to advance and grow in its services to education and the professions, or accept that state of respectable mediocrity which has been the lot of institutions of any type which fail to capitalize upon the strength and resources developed in their formative years.

Within the next ten years, nine new degree courses were to be added, including bachelor's programs in science, metallurgical and aeronautical engineering, master's programs in physics and aeronautical engineering, and doctoral curricula in chemistry, chemical engineering and aeronautical engineering. The enrollment, after its initial decline, was to spiral to 3,900 by the 1941-42 academic year, the year in American school history that was torn by the beginning of World War II. The Graduate School enrollment had nearly trebled, with evening undergraduate programs doubling in size to 2,600 and the day undergraduate student body experiencing an increase of about one-third. These were healthy signs; Polytechnic was moving forward.

As America emerged from the depths of the economic crises of the Nineteen Thirties, and moved into the fourth decade of the twentieth century, the "American Way of Life" was the catch-phrase describing the technological wizardry which had made this a "nation on wheels"; where millions of families in all economic brackets owned automobiles; where radios, refrigerators, electrical appliances of all kinds were considered necessities rather than luxuries; where the highways, the bridges, the buildings were almost fabulous in their conception, construction and abundance. America had reached the zenith, or so it seemed, of the achievements possible under the triad of steel-power-electricity.

On the scientific and technological horizons, however, were the silhouettes of discoveries and developments which would start an entirely new round of industrial activity, and again radically modify the "American Way of Life." Many of these fruitful, dramatic, revolutionary ideas and innovations were in the fields of polymer chemistry, electronics and aerodynamics.

The need to develop the research program, in order to reinforce and advance the teaching program and to attract leading scholars and students, was apparent to the administration. Already the Institute had on its staff an outstanding engineering scientist specializing in electronics, Dr. Ernst Weber, and it remained to capitalize upon his abilities. In 1940, the Institute succeeded in acquiring the services of Dr. Herman F. Mark, Austrian-born scientist, who was recognized then, as he is still today, as one of

the world's most important figures in polymer chemistry, who has not only made many outstanding contributions to the field of synthetic materials, but has trained hundreds of others who lead in the field. At about the same time, Dr. Nicholas J. Hoff, aircraft structure analyst whose calculations have become a guidepost in aircraft design throughout the world since 1938, also joined the Polytechnic staff.

Here was the nucleus around which a solid research program could be built. Here were the giants in the very fields which after the war were to be among the most dynamic and important in terms of research, development, production and contribution to the economy and cultures of all peoples throughout the world. Polytechnic made its start towards a mature research program and the war, so devastating in other respects, was to accelerate it, as happened throughout the country. This is perhaps best illustrated by the dollar value of the research reported at Polytechnic in the 1940's: 1942—$63,468; 1943—$119,999; 1944—$320,035; 1945—$506,930. From virtually nothing, Polytechnic research exceeded the half-million dollar mark in less than five years. By this time the teaching and research faculty had been steadily enriched by the addition of distinguished scientists and engineers in many fields. This was all in preparation for the final decade in Polytechnic's first one-hundred years—a period that might well be called Polytechnic's Golden Decade, which began with mingled joy and sorrow. Hostilities ceased in 1945, and for most of the 2,068 Polytechnic men who fought in the various branches of the armed forces, it meant a happy reunion with loved ones, and an eager return to their professions. There were, however thirty-six Polymen who laid down their lives in the cause of freedom, and it was their memory that cast a shadow of sorrow across the happy relief of peace restored. Reflecting the pride of Polytechnic men in their heroic sacrifices, and memorializing them in perpetuity, the Alumni Association established the World War II Memorial Scholarship awarded to an undergraduate student.

THE GOLDEN DECADE

Reviewing these ten years, we find a research program that has grown until $2,100,000 was spent on research in 1954. In this decade, about 340 research contracts have been sponsored by government and industry in Polytechnic laboratories. The faculty has grown to 192 full-time members assisted by an adjunct staff of 237 leading scientists and engineers from industry and the professions, plus a large research staff devoting its energies to research alone.

A recent survey showed that approximately 1,800 scholarly and scientific papers, articles, and books have been published by members of the Polytechnic staff since 1945. There is scarcely a meeting of any importance in Polytechnic's nine fields of science and engineering at which one or several presentations are not made by Polytechnic staff members. Many of these scientists and engineers are on top-level advisory committees for the United States government, the North Atlantic Treaty Organization, and other agencies. Polytechnic professors edit or are on the editorial boards of a half dozen or more technical journals of national and international character. Educational, scientific and professional societies in more than a dozen areas number among their present or past leaders members of the Polytechnic staff.

To be more specific, it can be said that in several fields Polytechnic Institute ends its first century with an eminence difficult to surpass. For example, there is the Polymer Research Institute, source of some of the most important research on macromolecules

Spicer Library and the Student Lounge

in recent years, and which has trained a very high percentage of the American PH.D's in this field. The Microwave Research Institute enjoys one of the best reputations in the United States and the world for its work on network theory and microwaves, and annually sponsors extended symposia attended by hundreds of leading scientists and engineers from here and abroad. The Aerodynamics Laboratory, under the direction of the internationally respected Dr. Antonio Ferri, whose superior as an all-around aerodynamacist would be hard to find, is performing top level research on supersonic and hypersonic aerodynamics which is pioneering in the field, and is substantially supported by the Air Force and Navy; Dr. Hoff's continuing structural research, now directed mainly to thermal problems, is of the highest order of importance.

There are other men, like Dr. Paul P. Ewald, one of the founders of the science of x-ray crystallography and still one of its masters; Dr. David Harker, another internationally known x-ray crystallographer, who is conducting a ten-year, $1,000,000 research project, supported by several agencies, to map the structure of a protein molecule in Polytechnic laboratories, and who gives promise of having the world's first success in this effort; Ronald M. Foster, one of the foremost research mathematicians in America today. There are also outstanding engineers like Administrative Dean Warren L. McCabe, one of the country's best known and most sought after chemical engineers; Professor Donald F. Othmer, another chemical engineer who is widely known as a consultant, and inventor of more than a dozen new production methods; Graduate School Dean Raymond Eller Kirk, for a score of years recognized as an outstanding chemist and educator, co-editor of the monumental Kirk-Othmer Encyclopedia of Chemical Technology, the masterpiece in its field in the English language. The list would grow too long if every distinguished scientist and engineer on the staff were to be mentioned. There are literally scores. Polytechnic is particularly fortunate because there is depth in each of these fields mentioned above; behind each of the leading scientists there are other men whose reputations are national and international in character and whose recognition has been based upon solid achievement.

As the centennial anniversary of Polytechnic's founding drew near, the Corporation Chairman, Mr. Potts, chose to bring to a close his illustrious term of office, which covered three decades. He had seen the Institute rise to the heights during this span

of years, a credit, in no small degree, to his prudent and faithful administration of his office. With Mr. Potts continuing as a member of the corporation, Mr. Preston R. Bassett succeeded him to the Chairmanship in 1952.

The enrollment figures in the past decade have been consistently high. The total annual registration has been in the vicinity of 6,500 students, sometimes a little more and other times a little less. The graduate school has regularly had the largest number of engineering registrants in the country, as has the evening session in general, while the over-all day and evening enrollment has kept Polytechnic at the top in registration, or close to it, among the nation's engineering colleges. Approximately five hundred students are registered annually in the Army R. O. T. C. regiment maintained at the school. About five hundred baccalaureate degrees are conferred each year in science and engineering, and approximately two hundred masters and doctors degrees. In the graduate school, at the close of Polytechnic's one-hundredth year, there were students from 28 foreign countries and 218 colleges and universities, who had come to study for their advanced degrees under Polytechnic professors.

THE CENTENNIAL

Polytechnic celebrated its Centennial during the 1954-55 academic year under the theme "Science, Engineering, Research, for Human Well-Being," climaxing the anniversary festivities with a major academic convocation on October 8, 1955 at the Brooklyn Academy of Music. The celebration was consistent with the purposes, objectives, and activities of the Institute, emphasizing scientific, engineering and educational meetings, more than two score in all, attended by thousands of the leaders in science, engineering, industry and education from the United States and abroad. The subjects of the conferences and meetings were as broad as Polytechnic itself: High Speed Aerodynamics, Modern Advances in Microwave Techniques, Fundamental Fibre-Fabric Relationships, Some Aspects of Civil Engineering in the Atomic Age, Small Gas Turbines, the Humanities in Technical Education, Fluidization in Practice, Advances in Chelate Chemistry, and Science, Invention, and the Atomic Future were some of the topics. In addition, programs were held at Polytechnic in conjunction with the regular meetings of professional societies, which honored the Centennial; among them were the American Mathematics Society, the American Crystallographic Association and the Middle Atlantic Section of the American Society for Engineering Education. The student body conducted a convocation attended by student delegates from more than thirty of the leading colleges and universities of the East. In the community, the President of the Borough of Brooklyn declared a Polytechnic Institute of Brooklyn Centennial Day and hailed the school's one hundred years of service; the Brooklyn Chamber of Commerce, the Downtown Brooklyn Association, the Brooklyn Rotary Club, the Brooklyn Civic Council joined with New York's One Hundred Year Association, the New York State Society of Professional Engineers, the New York Section of the American Society of Safety Engineers, the Exchange Club of Freeport, Long Island, and other groups in honoring the Institute. Felicitations were received from numerous American and foreign universities and professional societies. The Alumni Association sponsored a Centennial Dinner Dance and a Centennial Year Homecoming Day to add to the celebration. Finally, in a neat geometric progression, Polytechnic, at its 100th Commencement Exercises on June 16, 1955, conferred the 10,000th degree to be awarded in its history.

The last year of the first century also found Polytechnic scattered in fifteen Downtown Brooklyn locations, some owned, some rented, to house the mass of students and

volume of research that had come to its portals. Quite clearly, Polytechnic had long outgrown its home and the future would be grim indeed if a solution could not be found.

Dr. Rogers who, in addition to directing the building of the Polytechnic of its Golden Decade, had also managed to perform that modern miracle of higher education—operate a school without financial loss—turned his attention to this problem. His course was clear, but the means of navigating it were dubious. What had been written by the original Trustees one hundred years ago about the institution they were starting was as true as when written—Polytechnic had to be "as central, and as easily accessible as possible by public conveyance, from all parts of the city . . ." The suburbs and green campuses were not for Polytechnic. Its function, linked closely to the industries of the metropolitan area and the men working in them, demanded that the school remain convenient to the subways so that students, researchers and staff might conveniently come to it. Again, as the original Trustees thought, "no location could be selected the country over" better to benefit from the industrial life and activities of the area. Historically, professionally, practically, Polytechnic belonged in Brooklyn, just about where it was. How, then, to solve the dilemma?

A prime consideration in any effort to relocate the Institute in quarters adequate for its role in education and research had to be the cost. While the school had been operated without experiencing annual losses, it was not rich either in endowments or in the cash reserves needed to defray the capital expenditures which would be required to develop a new campus and build the necessary buildings, provided a site could be found in the desired area. Conservative estimates placed a minimum expenditure of $7,500,000 as what might be expected for the project. This was beyond the bounds of what a prudent Corporation and administration would want to assume. Yet Polytechnic's "housing" situation became more critical annually, and it was increasingly evident that some day in the not too distant future something would have to be done.

THE FUTURE

A stroke of good fortune—a Centennial Anniversary birthday gift, it seemed—provided the solution to the problem, when the American Safety Razor Corporation decided to give up its manufacturing activities in Brooklyn and dispose of its huge

Polytechnic's Army R.O.T.C. Regiment

industrial plant at a cost within the reach of Polytechnic Institute. Comprised of two eight-story factory and loft buildings, a five-story administration building, and other structures occupying a square block in downtown Brooklyn, it afforded 320,000 square feet of floor space admirably suited for adaptation to laboratories and classrooms. Perhaps best of all, it was located on the Borough of Brooklyn's beautiful and dramatic new $100,000,000 Civic Center, one of the outstanding developments of its kind ever undertaken in America. Whoever occupied the former industrial plant would be a part of this sparkling Center, in which great, white, marble, modern buildings would house many of the functions of city, county, and federal government. Finally, this site was as convenient to all subway lines, buses, bridges, tunnels and highways as the Livingston Street location.

The Corporation and Dr. Rogers did not hesitate long, once they had determined the suitability of the buildings and studied the costs involved in the purchase and conversion of the property. It was calculated that $3,500,000 would purchase Polytechnic a new home, and confidence was expressed that the 8,000 living alumni of the institution, the community and industries which it had served so well for a century, would support the project. Thus Polytechnic closed its first century alive with plans for the future, with its trust and confidence not only in its own potential for the years ahead, but in those whom it had served devotedly for so many years.

As Polytechnic Institute climaxed the celebration of its Centennial Anniversary in the Convocation held at the Brooklyn Academy of Music on October 8, 1955, the faculty and staff of this great urban institution did not consider that a century of service had been completed, but that a new century of service was just beginning. The accent was upon the future, not the past. Reflecting on the fact that the relentless progress of discovery and innovation makes it virtually impossible to draw any accurate picture of the America of 1980, the Polytechnic team of scientists and engineers, teachers and researchers, trustees, administrators, and students pledged renewed dedication to the Centennial Theme under which the One-Hundredth Anniversary had been celebrated—"Science, Engineering, Research for Human Well-Being."

Polytechnic Institute's new home, showing planned exterior remodeling and the proposed library

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